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INTERNATIONAL CONGRESS OF BIORHEOLOGY (3RD) HELD AT THE UNIVERS--ETC(U)
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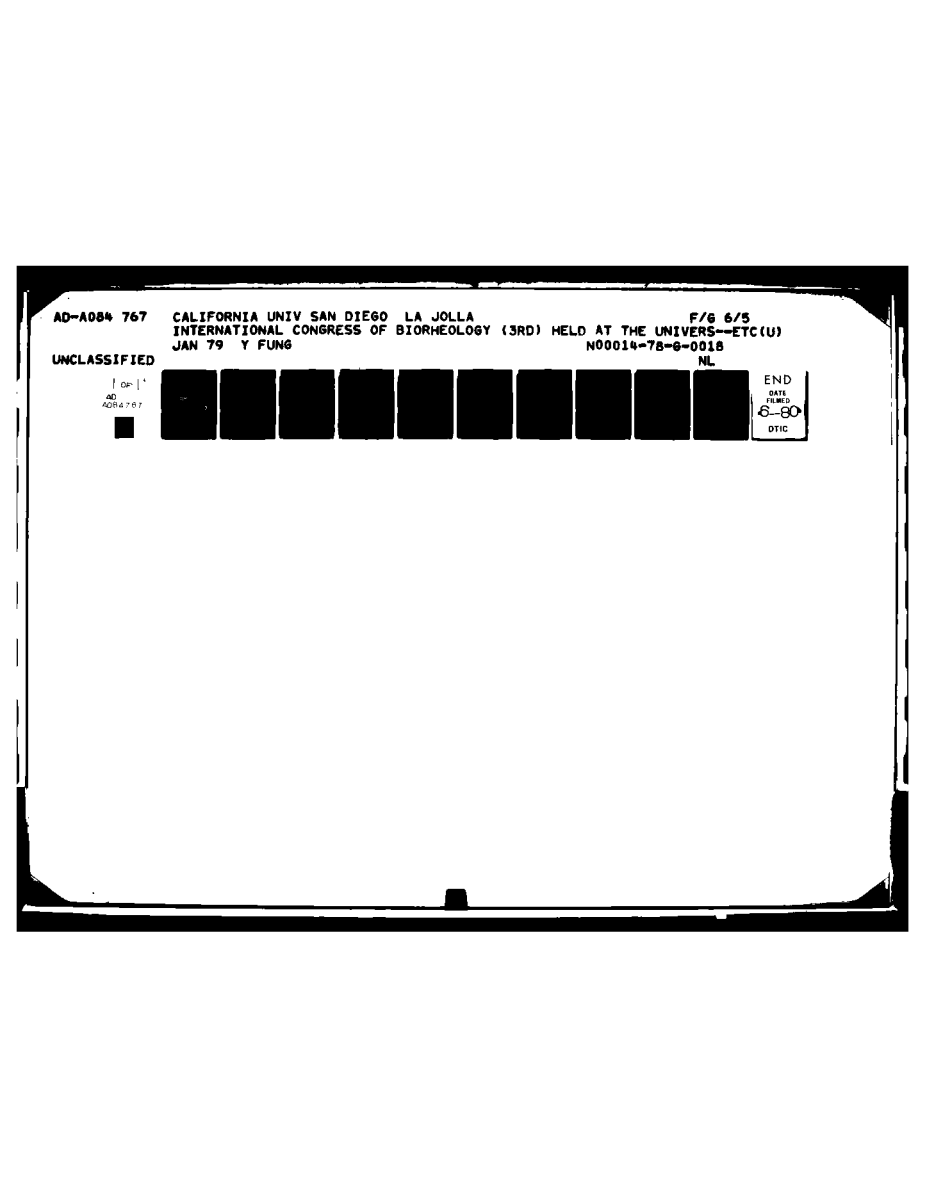

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REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER: One	2. GOVT ACCESSION NO.: AD-A084 767
3. RECIPIENT'S CATALOG NUMBER: (3rd)	
4. TITLE (and Subtitle): International Congress of Biorheology held at the University of California, San Diego on August 28 - September 1, 1978.	5. TYPE OF REPORT & PERIOD COVERED: 2/1/78 - 2/28/79
	6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s): Y. C. Fung (10) Yuan-Cheng Fung (15)	8. CONTRACT OR GRANT NUMBER(s): [redacted] N00014-78-G-0018
9. PERFORMING ORGANIZATION NAME AND ADDRESS: University of California, San Diego, La Jolla, California 92093	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS: (11) 30 Jan 79
11. CONTROLLING OFFICE NAME AND ADDRESS: Department of the Navy, Office of Naval Research, Biophysics Program, Arlington, Virginia 22217	12. REPORT DATE: 1/30/79
	13. NUMBER OF PAGES
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)	15. SECURITY CLASS. (of this report): Unclassified
	15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

LEVEL II

16. DISTRIBUTION STATEMENT (of this Report)

Unlimited

DTIC ELECTE MAY 19 1980 D

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

(9) Rept no. 1 (Final) 1 Feb 78-28 Feb 79

18. SUPPLEMENTARY NOTES

(12) 10L

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

biophysics, biorheology, biomechanics

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The purpose of the Congress is to assemble the world's active research workers in the field of biorheology to discuss the most recent advances in this science.

In recent years, there is a rapid increase in the number of people working in the field of biomechanics, which has applications to many areas of physiology, medicine, surgery and bioengineering in general. Biorheology

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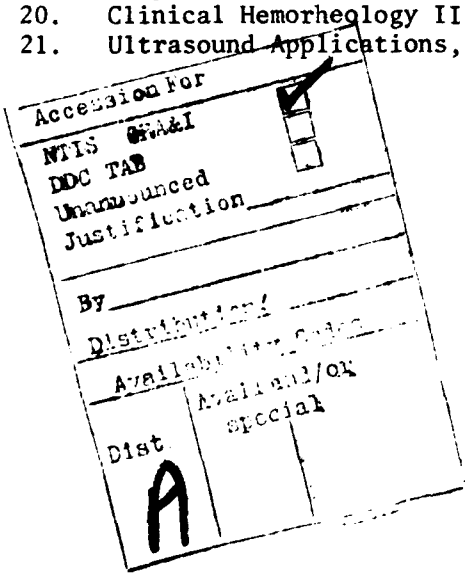
occupies a central position in biomechanics, because all biomechanical analysis require information on the rheological properties of the materials involved.

For this Congress, a total of 205 papers were presented in 27 sessions. The total number of authors was 350. A total of 308 participants attended the meeting. The six symposia presented are:

1. Molecular Forces in the Mechanics of Cell Membrane
2. Soft Tissues Around a Diarthrodial Joint
3. Muco-ciliary Transport
4. Recent Advances in Hemorheology
5. Rheology of Blood Vessels
6. Hemorheology in Astronautics

The other sessions are:

1. Cell Membrane and Chromatin
2. Biorheology of Lung, Airway, and Skin
3. Mucus Rheology
4. Dynamics and Thrombosis and Platelets
5. Biorheology of Muscles
6. Mathematical Biofluid Dynamics
7. Hemorheology: Viscoelasticity
8. Atherosclerosis
9. Capillary Blood Flow
10. Red Blood Cells
11. Mechanical Properties of Arteries and Veins
12. Hemorheology and Hemodynamics
13. New Hypotheses in Hemorheology and Muscle Contraction
14. Bone and Cartilage
15. Tissue Space
16. Elastin, Collagen and Tendons
17. Clinical Hemorheology I
18. Biofluid Dynamics
19. Properties of Biosolids
20. Clinical Hemorheology II
21. Ultrasound Applications, Biofluids and Viscoelastic Bodies



FEB 9 1979

OFFICE OF NAVAL RESEARCH

Grant N00014-78-G-0018

FINAL TECHNICAL REPORT

An International Congress on Biorheology

held on August 28 - September 1, 1978

Principal Investigator: Y. C. Fung

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University of California, San Diego

La Jolla, California 92093

January 30, 1979

THE THIRD INTERNATIONAL CONGRESS OF BIORHEOLOGY

I. INTRODUCTION

In recent years, there is a rapid increase in the number of people working in the field of biomechanics, which has applications to many areas of physiology, medicine, surgery and bioengineering in general. Biorheology occupies a central position in biomechanics, because all biomechanical analysis require information on the rheological properties of the materials involved. To clarify the fundamental issues of biorheology, an International Congress was held.

II. REPORT ON THE CONGRESS

The Congress was held in the week of August 28 to September 1, 1978 in La Jolla, California on the campus of the University of California, San Diego, under the chairmanship of Professor Yuan-Cheng Fung. Throughout the week the weather was perfect. There was sunshine everyday and the temperature was about 70°F. A total of 205 papers were presented in 27 sessions. The total number of authors was 350. A total of 308 participants attended the meeting.

The scientific program of the Congress consisted of six symposia:

1. Molecular Forces in the Mechanics of Cell Membrane
2. Soft Tissues Around a Diarthrodial Joint
3. Muco-ciliary Transport
4. Recent Advances in Hemorheology
5. Rheology of Blood Vessels
6. Hemorheology in Astronautics

and 21 scientific sessions:

1. Cell Membrane and Chromatin
2. Biorheology of Lung, Airway, and Skin
3. Mucus Rheology
4. Dynamics and Thrombosis and Platelets
5. Biorheology of Muscles
6. Mathematical Biofluid Dynamics
7. Hemorheology: Viscoelasticity
8. Atherosclerosis

9. Capillary Blood Flow
10. Red Blood Cells
11. Mechanical Properties of Arteries and Veins
12. Hemorheology and Hemodynamics
13. New Hypotheses in Hemorheology and Muscle Contraction
14. Bone and Cartilage
15. Tissue Space
16. Elastin, Collagen and Tendons
17. Clinical Hemorheology I
18. Biofluid Dynamics
19. Properties of Biosolids
20. Clinical Hemorheology II
21. Ultrasound Applications, Biofluids and Viscoelastic Bodies

In addition, there was a Convocation in which the past history of biorheology was reviewed by Professor Tamamushi and the future prospect was discussed by Professor Copley. The Poiseuille Medal of 1978 was awarded to Professor M. Joly and the Poiseuille Lecture entitled "Biorheology, A Factor of Scientific Progress" was presented by Professor Joly at the Convocation.

The symposia were organized by the following persons:
S. A. Berger, University of California, Berkeley
S. Chien, Columbia University, New York
K. Fronek, University of California, San Diego
G. Seaman, University of Oregon, Portland
R. Skalak, Columbia University, New York
S. Weinbaum, City University of New York
S. Woo, University of California, San Diego
T.Y.T. Wu, California Institute of Technology, Pasadena

All the symposia speakers were invited. In addition, 35 other authors were invited. These invited papers formed the major framework of the program. They offer a well rounded program in which every important aspect of biorheology is covered by a well-known authority. The invited speakers were:

M. ABE, Jikei University, Tokyo, Japan

T. AZUMA, Shinshu University, Matsumoto, Japan

D. E. BROOKS, University of British Columbia, Vancouver, Canada

C. G. CARO, Imperial College of Science & Technology, London, England

L. C. CERNY, Masonic Medical Research Laboratory, Utica, New York

S. E. CHARM, Tufts University, Boston, Massachusetts

H. CHMIEL, Institut fur Grenzflachen und Bioverfahrenstechnik,
Bundes Republic, Deutschland

T. H. COOK, Pennsylvania State University, University Park, Pa.

N. DAVIDS, Pennsylvania State University, University Park, Pa.

L. DINTENFASS, Sydney Hospital, Sydney, Australia

I. FATT, University of California, Berkeley, Ca.

W. P. GRAEBEL, University of Michigan, Ann Arbor, Mich.

J. F. GROSS, University of Arizona, Tucson, Ariz.

H. HARTERT, University of Kaiserslautern, Germany

R. H. HOCHMUTH, University of Washington, St. Louis, Mos.

C. R. HUANG, New Jersey Institute of Technology, Newark, N.J.

T. IWAZUMI, University of Washington, Seattle, Wa.

W. G. KNAUSS, California Institute of Technology, Pasadena, Ca.

B. KUMMER, Universitat zu Koln, Lindenburg, Germany

G. S. KURLAND, Harvard Medical School, Boston, Mass.

R. F. LANDEL, California Institute of Technology, Pasadena, Ca.

Y. LANIR, Israel Institute of Technology, Haifa, Israel

G. C. LEE, State University of New York, Buffalo, N.Y.

J. S. LEE, University of Virginia, Charlottesville, Va.

P. S. LINGARD, The Children's Hospital, Sydney, Australia

R. LITTLE, Michigan State University, East Lansing, Mich.

L. V. McINTYRE, Rice University, Houston, Tx.

J. W. MELVIN, University of Michigan, Ann Arbor, Mich.

M. ROACH, University of Western Ontario, Ontario, Canada

A. H. SACKS, Palo Alto Medical Research Foundation, Palo Alto, Ca.

H. SCHMID-SCHÖNBEIN, Rein.-Westf. Techn. Hochschule Aachen, Aachen
West Germany

M. G. SHARMA, Pennsylvania State University, University Park, Pa.

S. USAMI, Columbia University, New York, N.Y.

A. VIIDIK, University of Aarhus, Aarhus, Denmark
H. WAYLAND, California Institute of Technology, Pasadena, Ca.
V. M. ZAIKO, Institute of Organ and Tissue Transplantation, Moscow, U.S.S.R.

It was acknowledged by most participants that the scientific level of the Congress was very high. Technical advances reported at the Congress were extremely impressive.

The social program was also quite full. There was a reception and buffet dinner on Sunday, August 27th. On Monday, August 28th there was an evening party held on the beach of Scripps Institution of Oceanography on the Pacific Ocean. Under the stars a Hawaiian dance program was presented. On Wednesday afternoon, the delegates were taken to the famous San Diego Zoo for an enjoyable afternoon, and then watched two interesting motion pictures entitled "Sky Fire" and "Flying" at the Reuben H. Fleet Space Theater. This theater has a hemispherical curved screen and the movie was very unique in its presentation. On Thursday a banquet was held at the Atlantis Restaurant at which the Lamport Research Award was presented to John Pinto, and a musical program was performed by Mark Lockett. Dr. Roy Swank played some jazz, and presented an inspiring technical lecture on his research and development of blood microthrombi filter.

In association with the scientific program, an exhibition of paintings by L. Alcopley was presented at the Mandeville Art Gallery on the UCSD campus. L. Alcopley is A.L. Copley, past president of the International Society of Biorheology, and currently Director of the Laboratory of Biorheology, and Professor of life science and bioengineering at the Polytechnic Institute of New York in Brooklyn. This art exhibition was widely acclaimed. Many participants of the Congress enjoyed viewing an outstanding art exhibition of the work by one of their colleagues. The combination of a scientific program with an art exhibition, indeed, distinguished this Congress from all other Congresses.

A technical exhibition was also organized. Instruments used in biorheological research were on display throughout the week of the Congress.

The scientific program was sponsored by and had the financial support of the United States National Science Foundation, the Office of Naval Research, the University of Calfornia, San Diego, and the National Aeronautics and Space Administration. Their support is gratefully acknowledge.

The running of the Congress, the day-to-day details of the conference arrangements, the audiovisual aids, the meeting of the delegates at the airport and transporting them to the hotels and dormitories, the daily transportation from the hotels to the Congress sites and the entertainment of the Congress delegates at the reception, outing, and beach party were mostly the volunteer work of the students, faculty, and staff of the University of California, San Diego. They contributed greatly to the warmth and friendship at the Congress. To the, the Organizing Committee is very grateful.

III. PUBLICATION

Proceedings of the Third International Congress of Biorheology was issued as a single volume and distributed at the meeting to all participants. This proceedings volume was edited by Y. C. Fung and J. G. Pinto, and has a Library of Congress Catalog No. 78-67490. It contains also the detailed program of the Congress and an index of the authors.

A number of authors also prepared full length papers to be published in the Journal of Biorheology. These full length papers were reviewed for their scientific content in the normal fashion. At the time of writing of this final report, a total of 15 papers which were presented at the Congress had been accepted for publication, but none of them had appeared in print yet. They were in press. Undoubtedly, more papers which originated from the Congress will be submitted for publication at a later date.

IV. COMMENTS BY SOME PARTICIPANTS

A number of participants wrote to the Organizing Committee after the Congress. Since their expressions may reflect the quality of the Congress, we abstracted some of them below:

Professor Larry V. McIntire, Professor of Chemical Engineering, Rice University, Houston, Texas. "I would like to congratulate you on organizing an excellent Congress on Biorheology. The enthusiasm and dedication of you and your staff was truly impressive. I don't believe I have seen a meeting of this type run more smoothly, and the collection of papers was really quite good."

Professor Dr.-Ing. O. Mahrenholtz, Technische Universitat Hannover, West Germany. "The Congress was quite stimulating. This may pay off for the future."

Dr. Donald E. McMillan, M.D., Director of Diabetes Research, Sansum Medical Research Foundation, Santa Barbara, Ca. "I want to congratulate you on your most outstanding organization and management of the Third International Congress of Biorheology. I thoroughly enjoyed myself with the professional activities at the meeting and with the social activities in the evening hours. It was a privilege to visit with your group again. I learned a great deal at the meeting, which should help in my studies with diabetic erythrocytes."

Dr. E. Fukada, Sc. D., President Elect, International Society of Biorheology, Rikagaku Kenkyusho, Japan. "I enjoyed very much both scientific and social activities of the Congress. Many people said that this Congress was so well organized in spite of short period of preparation. I admire very much the wonderful achievements of this Congress performed by you and your group. The Congress was really successful and you have made wonderful achievements towards the progress of the science of biorheology."

Professor Walter Fabisiak, Manhattan College, New York. "I would like to take this opportunity to express my congratulations on your highly successful hosting of the Third International Congress on Biorheology. I was extremely impressed with the facilities at UCSD and greatly appreciated the exceptional hospitality exhibited by yourself and all of your associates."

Professor Bun-ichi Tamamushi, Professor emer. of Chemistry, Nezu Chemical Institute, Japan. "The Congress was, I think, so successful and I believe that all the participants came back to their laboratories with useful informations and satisfactions."

Dr. Peter A. Torzilli, Assistant Professor/Scientist, Cornell University Medical College & The New York Hospital, New York. "I would like to express my deep appreciation for a most exciting and informative experience at the Third International Congress of Biorheology. I found the meeting well organized, smoothly run and of exceptional high quality."

Professor M. G. Sharma, The Pennsylvania State University, Pennsylvania. "This is to express my thanks for the excellent arrangements made by you and your staff for the participants of the last International Congress on Biorheology. This conference happens to be one of the few well organized conferences that I have ever participated."

Professor C.G. Caro, Director Physiological Flow Studies Unit, Imperial College of Science and Technology, London, England. "I wanted to let you know that a superb meeting you organized and how much I enjoyed it, both scientifically and from the social point of view."

Dr. Masakazu Abe, Professor of Internal Medicine, Jikei University School of Medicine, Japan. "I pay my great respect on your excellent planning and management for the Congress."

Professor A. Silberberg, The Weizmann Institute of Science, Rehovot, Israel. "I cannot tell you enough how highly appreciated the meeting was and how in every respect it exceeded our highest expectation."

Professor Masamitsu Hasegawa, Associate Professor of Physiology, Shinshu University Medical School, Japan. "I was very honored to have been given the opportunity of presenting the paper to the Congress in collaboration with Professor Azuma. I was also impressed with your qeustion after my presentation and very pleased with your gentle and sincere personality. This has encouraged me in my research work."

Dr. Margot R. Roach, M.D., Ph.D., Professor of Biophysics and Medicine. The University of Western Ontario. Ontario, Canada. "I think the meeting was the best I had attended and think you and your colleagues should be congratulated."

Mrs. Harold Lamport, Mount Sinai School of Medicine, The Lamport Foundation, New York. "I am truly touched by your excellent report of the International Congress of Biorheology. We have gone through all the interesting material and read Dr. Pinto's obviously important paper. Your choice of Dr. Pinto was perfect for our 1st Dr. Harold Lamport Research Award. I agree with you that his work will have an important impact on the study of cardiology.

I want to tell you that my children and I are very grateful to you personally for your consideration and understanding, and reporting so fully what we want to know. May I say that your report was the best one of the 28 Prizes/Awards we give."

V. CONCLUSION

The Third International Congress was successfully concluded. The Fourth Congress will be held in 1981 in Tokyo under the Chairmanship of Dr. Eiichi Fukada. Dr. Fukada is a well-known author in the field of bioelectricity. He works in the Institute of Physical and Chemical Research in Japan.